



EXECUTIVE SUMMARY: COMPARISON OF PEAK DISCHARGES AMONG SITES WITH AND WITHOUT VALLEY FILLS FOR THE JULY 8-9, 2001 FLOOD IN THE HEADWATERS OF CLEAR FORK, COAL RIVER BASIN, MOUNTAINTOP COAL-MINING REGION, SOUTHERN WEST VIRGINIA

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The U.S. Geological Survey (USGS), in cooperation with the Office of Surface Mining Reclamation and Enforcement, investigated the effects of valley fills on the peak discharges for the flood of July 8-9, 2001. Results of this investigation indicate the sites without valley fills had peak discharges with 10- to 25-year recurrence intervals. The flood recurrence intervals for the three basins with valley fills were determined as though the peak discharges were those from rural streams without the influence of valley fills, and ranged from less than 2 year to greater than 100 years.

Introduction

Six small basins (drainage areas ranging from 0.189 to 1.17 mi²) within an area of about 7 mi² in the headwaters of Clear Fork of the Coal River in the Appalachian Plateaus Physiographic Province of southern West Virginia were selected for investigation following the flood of July 8-9. The 7-mi² area was assumed to be small enough that the rainfall intensities and totals would be approximately equal for the six basins. The six basins and site identifications are: Unnamed Tributary to Lick Run, USGS1; Unnamed Tributary to Clear Fork, USGS2; Unnamed Tributary to Buffalo Fork, MT65C; Buffalo Fork, MT66; Ewing Fork, USGS3 (near MT69); and, Reeds Branch, MT76. The “USGS” prefix indicates the site was selected by the USGS for this study, and the “MT” prefix indicates the site was already being used for preparation of the Mountaintop Mining/Valley Fill Environmental Impact Statement (EIS). There are three sites in basins without valley fills (USGS1, USGS2, and USGS3) and three sites in basins with valley fills (MT65C, MT66, and MT76). The three sites in basins with valley fills are located downstream from the ponds at the toe of the fills.

In the early morning of July 8, 2001, a thunderstorm complex formed in central West Virginia from outflow winds of an earlier group of thunderstorms that had moved across northern West Virginia. The thunderstorm complex moved southeast from central West Virginia and into southeastern West Virginia by late morning on July 8, and by early afternoon 3- to 6-inches of rainfall had fallen in 5- to 6-hours.

Flooding from the thunderstorm complex was primarily caused by intense rainfall on relatively dry ground. Rainfall totals for the storm were approximately equal to the monthly average of about five inches (written commun., National Weather Service, 2001). The gaging station for Clear Fork at Whitesville (USGS station number 03198350) has a drainage area of 62.8 mi² and is located downstream from the study area. The indirectly measured peak discharge, caused by the July 8-9 storm, at this station had a frequency greater than 100 years.

Indirect Measurements of Peak Discharge

Indirect measurements of peak discharge for the six study sites ranged from 45 to 228 ft³/s. (table 1).

The study plan assumed the six study basins were within an area (7 mi²) small enough that rainfall intensities and totals would be approximately equal, but this assumption was determined invalid. The flood recurrence intervals for the three basins without valley fills should be approximately equal if the assumption was correct. Table 1 shows that the flood recurrence intervals for the three basins without valley fills (USGS1, USGS2, and USGS3) are not equal. The flood frequencies were between 10 and 25 years with the greatest flood frequency at the most southern basin, USGS1.

Table 1. Indirectly measured peak discharges and estimated recurrence intervals for the flood of July 8-9, 2001 at the six study sites, in the headwaters of Clear Fork, Coal River Basin, mountaintop coal-mining region, southern West Virginia

[USGS(n) identifies a site selected by the U.S. Geological for this study; MT(n) indicates that the site being used in this study was part of the Mountaintop Mining/Valley Fill Environmental Impact Statement study, where (n) is a unique numeric or alphanumeric identification.]

Basin name	Site identifier	Latitude	Longitude	Drainage area, in square miles	Indirectly measured peak discharge, in cubic feet per second	Estimated flood recurrence interval, in years ^a
Basins without valley fills						
Unnamed Tributary to Lick Run	USGS1	37°52'36"	81°18'31"	0.461	140	25
Unnamed Tributary to Clear Fork	USGS2	37°52'42"	81°19'50"	.360	90	10
Ewing Fork ^b	USGS3	37°54'45"	81°19'34"	1.17	228	10
Basins with valley fills						
Unnamed Tributary to Buffalo Fork	MT65C	37°53'48"	81°19'38"	.189 ^c	113	>100 ^d
Buffalo Fork	MT66	37°53'47"	81°19'09"	.583	224	50-100 ^d
Reeds Branch	MT76	37°54'28"	81°18'46"	.462	45	<2 ^d

^a Flood recurrence interval was determined using Wiley, and others (2000) and considering the sensitivity of calculated discharges to Manning's roughness coefficients.

^b Site is near MT69, which was used to prepare the Mountaintop Mining/Valley Fill Environmental Impact Statement (Wiley and others, 2001).

^c Drainage area was revised from the 65 acres (0.102 square miles) used to prepare the Mountaintop Mining/Valley Fill Environmental Impact Statement and is the value published by Wiley and others (2001).

^d Flood recurrence interval of indirectly measured peak discharge as though the peak discharge was that from a rural stream without the influence of valley fills.

The flood recurrence intervals for the three basins with valley fills (determined as though the peak discharges were those from rural streams without the regulation of valley fills) were between less than 2 years and greater than 100 years (table 1). The smallest recurrence interval was at MT76, the site in the most northern basin with valley fills, no active surface mining, a reclaimed valley fill, and the largest valley fill in this study. The greatest recurrence interval was at MT65C, the site in a basin with active surface mining, one reclaimed and one unreclaimed valley fill. The site MT65C has the only unreclaimed valley fill in this study.

The indirect measurement for the site MT65C was made at the outflow of a pond downstream from two valley fills. The drainage area of MT65C, 0.189 mi², is a revised value from the 65 acres (0.102 square miles) previously used to prepare the Mountaintop Mining/Valley Fill EIS and published by Wiley and others (2001). Including only one of the two valley fills in the previous measurement probably caused the incorrect determination of drainage area.

Source: Wiley, J.B., and Brogan, F.D., 2003, Comparison of peak discharges among sites with and without valley fills for the July 8-9, 2001, flood in the headwaters of Clear Fork, Coal River Basin, mountaintop coal-mining region, southern West Virginia: U.S. Geological Survey Open-File Report 03-133.

References Cited

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